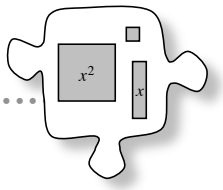
3-23. Mr. Hill has a deck of math flashcards that include addition, subtraction, and multiplication problems. Twenty-five cards show addition problems, 30 are subtraction problems, and 45 are multiplication problems.

a. What is the probability of drawing a card with an addition or subtraction problem on it?

b. If Mr. Hill adds 40 division flashcards to the deck, what will P(division) be?

c. In the new deck, which is greater: the probability of drawing an addition or subtraction flashcard, or the probability of drawing a multiplication or division flashcard? **Justify** your conclusion.

3.1.3 How can I rewrite it?



Combining Like Terms

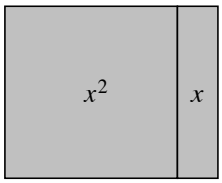
In Lesson 3.1.2, you looked at different ways the perimeter of algebra tiles can be written, and created different expressions to describe the same perimeter. Expressions that represent the same perimeter in different ways are called **equivalent**. Today, you will extend your work with writing and rewriting perimeters to more complex shapes. You will rewrite expressions to determine whether two perimeters are equivalent or different. As you work today, keep these questions in mind:

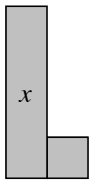
Are there like terms I can combine?

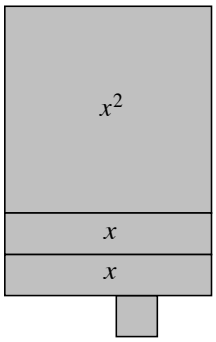
How can I rearrange it?

How can I see (**visualize**) it?

3-24. Build each of these shapes using algebra tiles and look carefully at the lengths of the sides:

i. 

ii. 

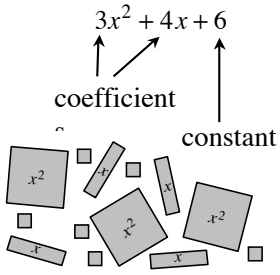
iii. 

a. Sketch each figure on your paper and color code the lengths that are the same. Which figures have side lengths that are different than those you have measured before? How are they different?

b. Label each length on your paper. Discuss with your team how to label the new lengths. Explain your **reasoning**.

c . Find the perimeter of each figure. Write the perimeter in simplest form by combining the like terms.

3-25. In any expression, the number that tells you how many of each variable or quantity you have is called a **coefficient**.



For example, for the expression that describes the collection at right, the coefficient "3" shows that there are three x^2-tiles, and the coefficient "4" shows that there are four x-tiles. The 6 is the **constant**, because it shows the number of units.

Answer each question below for each of the perimeters you found in problem 3-24.

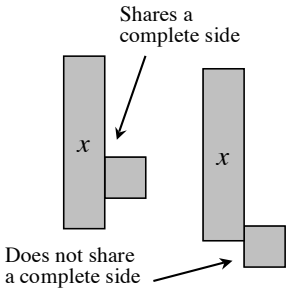
- How many x (or y) lengths are there in the perimeter?
- How do you **see** the coefficient of x (or y) in your expression and in the shape?
- What is the constant in the expression? How do you **see** the constant in the shape?

3-26. HOW MANY PERIMETERS?

Erik cannot keep his hands off the algebra tiles! He has made several different shapes, each one using the same tiles. *"Will every shape I create with these tiles have the same perimeter?"* he wonders.

Help Erik investigate by making different shapes with your team. Your shapes must follow these rules:

- Shapes must use exactly three tiles: a one tile, an x-tile, and an x^2-tile.
- Tiles must share a complete side. An example of tiles that do, and do not, share complete sides is shown at right.



a. Rearrange the tiles until each teammate has a shape that follows the rules and has a different perimeter. Discuss why the perimeters are different. Trace each shape, color-code the sides, and label their lengths. Write an expression for the perimeter of each shape and simplify it by combining like terms.

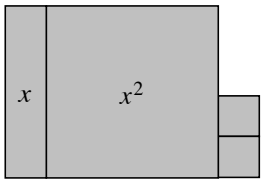
b. Are other perimeters possible with the same pieces? As you find others:

- Trace the shapes.
- Color-code and label the sides.
- Write the perimeter in simplest form.

Be prepared to share your list of perimeters with the class.

c. Are there different shapes that have the same perimeter? Why or why not?

3-27. **Additional Challenge:** Build this shape out of algebra tiles. Then, on grid paper, draw the shape when x is equal to each of the lengths below.



a. $x = 5$ units b. $x = 3$ units

c. $x = 2$ units d. $x = 1$ unit

3-28. LEARNING LOG

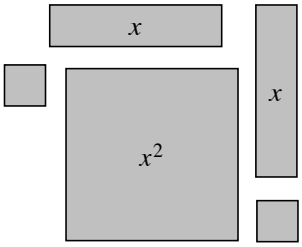
In your Learning Log, describe what a "term" is in math. Using algebra tiles, make up an example to explain how to combine like terms. Why is it useful to combine like terms? Title this entry "Combining Like Terms" and include today's date.

METHODS AND MEANINGS

MATH NOTES

Combining Like Terms

A **term** is an expression that contains a single number (called a **constant**), single variable, or the product of numbers and variables. This course uses tiles to represent variables and constants. Combining tiles that have the same area to write a simpler expression is called **combining like terms**. See the example shown at right.



$x^2 + 2x + 2$

More formally, **like terms** are two or more terms that have the same variable(s), with the corresponding variable(s) raised to the same power.

Examples of like terms: $2x^2$ and $-5x^2$, $4ab$ and $3ab$.

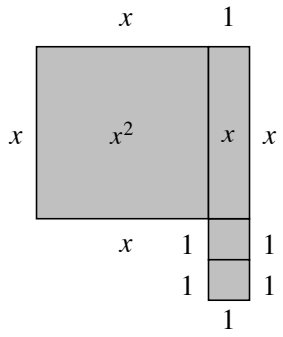
Examples that are *not* like terms: 5 and $3x$, $5x$ and $7x^2$, a^2b and ab.

When you are not working with the actual tiles, it helps to **visualize** them in your mind. You can use these images to combine those terms that are the same. Here are two examples:

Example 1: $2x^2 + x + 3 + x^2 + 5x + 2$ is equivalent to $3x^2 + 6x + 5$

Example 2: $3x^2 + 2x + 7 - 2x^2 - x + 7$ is equivalent to $x^2 + x + 14$

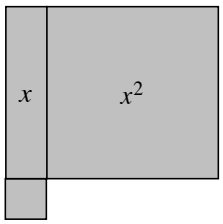
When several tiles are pushed together and form a more complicated figure, the area of the new figure is the sum of the areas of the individual pieces, and the perimeter is the sum of the lengths around the outside. Area and perimeter expressions can be **simplified**, or rewritten, by combining like terms.

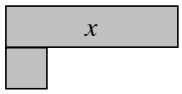


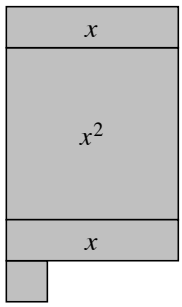
For the figure at right the perimeter is:
$x + 1 + x + 1 + 1 + 1 + 1 + 1 + x + x = 4x + 6$ units

Review & Preview

3-29. Find the perimeter of each figure made of algebra tiles below.

a. 

b. 

c. 

3-30. Copy and simplify each expression.

a. $6+(-18)$ b. $12+(-25)$ c. $-9+(-9)$ d. $-12+6+15$

3-31. Find the mean, mode, range, and median of the values:

12, 4, −2, 0, 9, −2, 1, 7, 8, 2.

3-32. Sketch the collection of algebra tiles that is described by the following expression. Rewrite the area of the collection by combining like terms.

$$7x+2x^2+3x^2+3+x$$

3-33. Copy and complete the portions web at right by including a picture, decimal, and percent representation of $\frac{9}{20}$.